

What is claimed is:

1. A semiconductor memory device comprising:
a nonvolatile memory section; and
a volatile memory section, wherein
5 the nonvolatile memory section includes a nonvolatile memory cell having a gate electrode formed on a semiconductor layer via a gate insulating film, a channel region disposed under the gate electrode, diffusion regions disposed on both sides of the channel region and having a
10 conductive type opposite to that of the channel region, and memory functional units formed on both sides of the gate electrode and having a function for retaining charges.
2. The semiconductor memory device according to
15 claim 1, wherein the volatile memory section includes an SRAM.
3. The semiconductor memory device according to claim 2, wherein
20 the nonvolatile memory cell and the SRAM are formed on a single chip.
4. The semiconductor memory device according to claim 1, wherein
25 the volatile memory section includes a DRAM.

5. The semiconductor memory device according to claim 4, wherein

the volatile memory section includes refreshing operation means for refreshing the DRAM.

6. The semiconductor memory device according to claim 1, further comprising:

a first chip forming the nonvolatile memory section;
10 a second chip forming the volatile memory section;
and

a single package containing therein the first chip and the second chip.

15 7. The semiconductor memory device according to claim 1, wherein

at least a part of the memory functional units overlaps with a part of the diffusion region.

20 8. The semiconductor memory device according to claim 1, wherein

the memory functional units include a retaining film having a function for retaining charges, and a surface of the retaining film is arranged almost in parallel to a surface of
25 the gate insulating film.

9. The semiconductor memory device according to claim 8, wherein

the film having the function of retaining charges is
5 arranged almost in parallel to a side surface of the gate electrode.

10. The semiconductor memory device according to claim 1, wherein

10 the memory functional units include a retaining film having a function for retaining charges and an insulating film for separating the retaining film from one of the channel region and the semiconductor layer, the insulating film having a thickness smaller than that of the gate
15 insulating film and not smaller than 0.8 nm.

11. The semiconductor memory device according to claim 1, wherein

the memory functional unit includes a retaining film
20 having a function for retaining charges and an insulating film for separating the retaining film from one of the channel region and the semiconductor layer, the insulating film having a thickness greater than that of the gate insulating film and not greater than 20 nm.

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12. A semiconductor device comprising:
the semiconductor memory device according to claim
1; and
a logical operation section for performing operation
5 processing on the basis of information stored in the
semiconductor memory device.

13. A portable electronic apparatus comprising the
semiconductor memory device according to any one of
10 claims 1 to 11.

14. A portable electronic apparatus comprising the
semiconductor device according to claim 12.